

# **LIQUID FUEL OIL TRANSFORMATION DEVICE**

## **FIELD OF THE INVENTION**

The present invention is related to a liquid fuel oil transformation device, particularly to a liquid fuel oil transformation device of environment protection with safety and fuel saving, by means of a low-pressure fanning means cooperating with appropriate fuel oil and a constant-temperature means.

## **BACKGROUND**

In the past, for a general combustion heater, such as gas burner, vapor burner, gas lamp, vapor lamp, used in the residential or commercial place, it is operated essentially by filling a high-pressure steel bottle with high-pressure liquefied gas fuel, and then directing vaporized gas with reduced pressure to the gas burner through the tube and the opening of the steel bottle, in order for ignition. Alternatively, it is operated by pumping high-pressure air, via an air compressor, into a vessel having liquid fuel oil contained therein, for impelling the liquid fuel to spray, as directed by the tube, and then mix with air for ignition, or by heating the tube so as to vaporize liquid fuel oil, and then igniting for combustion. Thus, the effect of heating may be achieved.

Although much convenience has been provided for human being by the above combustion heater, the dangerous explosion of a high-pressure vessel (Generally, a pressure greater than 800 lb/m<sup>2</sup> is required.), needed to be used with the combustion heater, is liable to occur, due to an improper operation, abruptly change in ambient temperature, collision, or other accidents. It is apt for the vaporized gas, nature gas, and liquid fuel to accumulate concentration locally when leakage occurs with carelessness, because the specific weight of them is greater than that of air. As such, once the spark or high-temperature object appears, the disaster, such as gas explosion and fire accident, will be incurred.

Moreover, the state of incomplete combustion is liable to be established, owing to a higher content of sulfur and nitrogen in these fuel, as well as uneven mixture of high-pressure exit vapor with air. In this case, firstly, the efficiency of energy conversion thereof is poor, while the higher combustion temperature is unattainable, resulting in wasting energy; and secondly, it is liable for the incomplete combustion to generate toxic gas, such as sulfur oxide and carbon monoxide, thus harmful to human life.

For the purpose of preventing these potential factors of hazard, rescuing disasters that have been occurred, as well as comforting visible and invisible scars resulted from disasters, significant cost must be paid for all of them unknowingly by

the whole society and considered as a serious burden.

### **SUMMARY OF THE INVENTION**

Accordingly, it is a primary object of the present invention to provide a liquid fuel transformation device of environment protection, essentially providing a fuel oil conversion cylinder, having a fuel oil body contained therein, used with a high-temperature means and a low-pressure fanning means, such that the fuel oil could be vaporized at low temperature-low pressure for eliminating the danger of gas explosion.

It is a secondary object of the present invention to provide a liquid fuel transformation device of environment protection, the fanning means thereof being equipped with a check valve for the prevention of an adverse flow as well as a consequent spill of air, fuel oil, and oil vapor.

It is another object of the present invention to provide a liquid fuel transformation device of environment protection, essentially providing a temperature controller and a constant-temperature rod allowed for deeply penetrating into the fuel oil body, such that a suitable temperature of the fuel oil for facilitating the generation of oil vapor may be maintained.

It is still another object of the present invention to provide a liquid fuel transformation device of environment protection, in which the fuel oil body may include a common solvent, n-Hexane, and an interface active agent, for preventing the accumulation of moisture, which would otherwise degrade the quality of fuel oil.

It is yet another object of the present invention to provide a liquid fuel transformation device of environment protection, the oil vapor generated by which may be applicable to various combustion devices used with gas and liquid fuel, for not only saving energy, but also guaranteeing safety when these devices are operated.

For the purpose of achieving aforementioned and other objects, the present invention provides a liquid fuel oil transformation device of environment protection, the main structure thereof comprising a fuel oil conversion cylinder containing a fuel oil body therein, and provided with a fuel oil filling port used for adding fuel oil, a constant-temperature means, and a fanning means used for feeding air into the fuel oil conversion cylinder beneficial for generating oil vapor containing fuel oil and then for outputting the oil vapor from the fuel oil conversion cylinder; a vapor transportation pipe, one end of which is connected to the fuel oil conversion cylinder for delivering fuel vapor; and a base connected to the other end of the vapor transportation pipe and provided with a coupling portion for coupling to an oil vapor combustion device. As cooperating with the low-pressure fanning means further, oil vapor for combustion may be effectively generated at the state of low temperature-low pressure, resulting in

not only saving fuel, but also avoiding the danger of gas explosion.

### **BRIEF DESCRIPTION OF DRAWINGS**

Fig. 1 is a perspective view according to one embodiment of the present invention;

Fig. 2 is a schematic cross-section view of a fuel oil conversion cylinder according to the present invention; and

Fig. 3 is a perspective view according to another embodiment of the present invention.

### **DETAILED DESCRIPTION**

The structural features and the effects to be achieved may further be understood and appreciated by reference to the presently preferred embodiments together with the detailed description.

Firstly, referring to Figs. 1 and 2, there are shown a perspective view according to one embodiment of the present invention and a cross-section view of a fuel oil conversion cylinder, respectively. As illustrated in these figures, the main structure of a fuel oil transformation device of the present invention comprises a fuel oil conversion cylinder 10, a vapor transportation pipe 145, and a base 20. In which, the fuel oil conversion cylinder 10 is essentially presented as a cylinder containing a fuel oil body 30 therein. The top end of the fuel oil conversion cylinder is provided with a fuel oil filling port 16, a fanning means, a constant-temperature means, and a vapor outlet valve 14, as well as additionally equipped with an upper housing 103 covering over the fuel oil conversion cylinder 10 for protecting the structure and elements thereof.

In which, the fuel oil filling port 16 may be used for adding fuel oil timely for avoiding the depletion of oil fuel. The fanning means essentially includes a low-pressure fanning motor 125 and a pressure-controlling switch 127. The low-pressure fanning motor 125 is used for blowing air into the interior of cylinder, through a fanning pipe 123 extended to the bottom of the cylinder. A check valve 121 is further provided between the fanning pipe 123 and the fanning motor 125, for preventing air, fuel air, and even oil vapor to flow adversely toward the fanning means along the fanning pipe 123. The pressure-controlling switch 127 is allowed for controlling the operation of the fanning motor 125 for preventing the accumulation of pressure inside the cylinder, and thus the factor of possibly leading to danger may be eliminated. The constant-temperature means may include a temperature controller 183, and a constant-temperature rod 181 equally penetrating deeply into the fuel oil body 30 to extend toward the bottom of the cylinder. Moreover, there further comprises a

battery 15 in the fanning means for saving and supplying electric power required for the fanning motor 125.

In the operation of the fuel oil conversion cylinder according to the present invention, after filled with fuel oil 30, the fuel body 30 is heated by the constant-temperature rod 181 and an appropriate temperature (for instance, a vaporization temperature, or a temperature a little lower than the vaporization temperature) is then maintained by the temperature controller 183, in order to avoid a reduced temperature of fuel oil, which would otherwise degrade efficiency, resulted from vaporization. The fanning means may blow air into the interior of the cylinder through the fanning pipe 123 at a low pressure. Except for slightly increasing the pressure inside the cylinder for facilitating the discharge of oil vapor, such a fanning operation is provided for further facilitating the effect of vaporization of the fuel oil body 30, since the fanning outlet is resided below the liquid level of the fuel body 30.

A vapor space 101, not occupied by the fuel oil body 30, within the interior of the cylinder will be filled with the combustible oil vapor after part of the fuel oil body 30 is vaporized. The pressure inside the cylinder could be controlled, by the pressure-controlling switch 127 in the fanning means, to slightly higher than external atmosphere, in such a way that the oil vapor may be escaped through the vapor outlet valve 14 and directed into the base 20 via the vapor transportation pipe 145, only opening the vapor outlet valve 14 is required. The base 20 is provided with a coupling portion 22 for the assembly of various oil vapor combustion devices, such that the latter may be applicable.

In this embodiment, the coupling portion 22 of the base 20 is joined with a burner head 24. The oil vapor may be supplied to the burner head 24 through the coupling portion 22 for ignition.

Moreover, for the fuel oil transformation device of the present invention, the fuel oil body 30 is selectively composed of common solvent as host, and such a host is mixed with certain amount of n-Hexane, perfume selected differently depending on individual like, and a small amount of interface active agent allowing for mutually dissolving water with fuel oil. The vaporization temperature of the overall fuel oil may be reduced in case the certain amount of n-Hexane is added to the common solvent. The vaporization temperature of the fuel oil in this present invention is approximate to 30°C under room temperature-room pressure. Further cooperating with the fuel oil conversion cylinder 10 of the present invention, the best condition of the system performance may be obtained when the constant-temperature means is set such that the temperature of the fuel oil body 30 is maintained at a constant value of 30°C, and the pressure-controlling switch 127 in this fanning means is also set such that the pressure inside the cylinder is maintained between 0.03 to 0.06 kg/m<sup>2</sup>.

The oil vapor, generated on the basis of aforementioned components of fuel oil and device settings, is liable to be escaped and consequently diluted by air after contacted with air, since the weight of such oil vapor is lighter than that of air. Thus, the accumulation of oil vapor will never occur. By means of experiment, it is verified that, in the general residential environment, the oil vapor released from the burner head may be diluted by air to a incombustible state at a position far away from the burner head by more than 1 centimeter. Thereby, the danger of gas explosion, resulted from the conventional use of gas or nature gas, may still not turn up, even though a great amount of oil vapor leaks out for a long time. Moreover, a full combustion for the components of oil vapor may be completed after ignited within a range of 1 centimeter spacing from the burner head, also due to the fact that the oil vapor and air may be fully blended together easily. In this manner, the efficiency of energy conversion may be extremely high, and the temperature of the burner fire may reach a level between 1000 to 1200°C, resulting in saving energy without toxic gases generated from incomplete combustion. Whereby, it is truly a great fortune to the industry as well as environment ecological protection.

Further, the moisture impurity contained in fuel oil or the vapor entering into the cylinder with air when fanning may be combined with fuel oil, caused by the addition of interface active agent used for mutually dissolving water with fuel oil into the fuel oil body 30, for generating oil vapor to be burned altogether and thus vaporized, without continuously accumulating in the cylinder to degrade the quality of fuel oil. The odor of added perfume may be selected differently depending on individual like for providing the annoying kitchen working with more delight. Additionally, the components of the fuel body 30 according to the present invention are all uncontrolled chemical substance, where the content of sulfur may be less than 5 ppm, and that of nitrogen may be less than 2 ppm (referring to Appendix 1 of an oil analysis report issued by Refining & Manufacturing Research Institution, Chinese Petroleum Corporation), both of them being for lower than that in common petrochemical fuel. When burning, the generation of pernicious gases such as sulfur oxide and nitrogen oxide, as examples, is thus reduced.

Finally, referring to Fig. 3, there is shown a perspective view according to another embodiment of the present invention. As illustrated in this figure, essentially, the substantial structure according to the embodiment illustrated in Fig. 1, such as fuel conversion cylinder 10, vapor transportation pipe 145, and base 20, as examples, may be employed once again, where the coupling portion 22 of the base 20 is equipped with a oil vapor lamp 40, mainly comprising a coupling body 42, a lampshade 44, a vapor duct 46, and a lamp wick 48.

The coupling body 42 may be fixedly joined with the coupling portion 22 of

the base 20. The vapor duct 46 is then fixed on the coupling body 42, and the lamp wick 48 is further covered at one end of the vapor duct 46. Moreover, the lampshade 44 is provided on the coupling body 42 for encircling the vapor duct 46 and the lamp wick 48 inside, whereby the effect of windproofing and lamp wick protection may be provided. Additionally, the oil vapor lamp may be further provided with an upper shade 441 onto the lampshade to enhance the effect of shelter.

The coupling body 42 may be further equipped with an adjustment button 421, used for controlling the flow of oil vapor, entering into an oil vapor lamp 40 from the coupling portion 22 of the base 20 and subsequently directed toward the lamp wick 48 to be burned through the vapor duct 46, in order to achieve the adjustment of the brightness of the oil vapor lamp.

Furthermore, in the fuel oil transformation device of environment protection according to the present invention, the oil vapor thus generated may be applicable to all kinds of conventional combustors used with gas, nature gas, and vaporized liquid fuel, such as various stoves, hot-water heaters, and gas lamps, as examples. Thereby, without the change of original design, much higher efficiency of energy conversion and much more safeguard could be obtained, and only that the base of the present invention is replaced by above various combustors may be required.

To sum up, the present invention is related to a liquid fuel oil transformation device, particularly to a liquid fuel oil transformation device of environment protection with safety and fuel saving, essentially for obtaining the effect of fuel saving, gas explosion prevention, and other safety guaranteeing, by means of a low-pressure fanning means cooperating with appropriate fuel oil and a constant-temperature means. The foregoing description is merely one embodiment of present invention and not considered as restrictive. All equivalent variations and modifications in process, method, feature, and spirit in accordance with the appended claims may be made without in any way from the scope of the invention.

#### **LIST OF REFERENCE SYMBOLS**

10	fuel oil conversion cylinder
101	vapor space
103	upper housing
12	fanning means
121	check valve
123	fanning pipe
125	fanning motor
127	pressure-controlling switch
14	vapor outlet valve

145	vapor transportation pipe
15	battery
16	fuel oil filling port
183	temperature controller
181	constant-temperature rod
20	base
22	coupling portion
24	burner head
30	fuel oil body
40	oil vapor lamp
42	coupling body
421	adjustment button
44	lampshade
441	upper shade
46	vapor duct
48	lamp wick